

CS400 Final Exam Study Questions

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v2.0



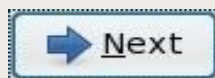
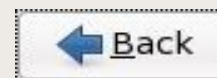


MCQ Question 1

What is the output of the following command?

```
cat /dev/null
```

- A) No output
- B) EOF
- C) An infinite string of zeroes
- D) An infinite string of random data
- E) The contents of the null disk device

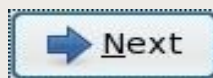




MCQ Question 2

Select all of the following answer choices that do the same thing as **grep hello file.txt**

- A) `cat file.txt | grep hello`
- B) `grep hello < file.txt`
- C) `cat file.txt > grep hello`
- D) `file.txt > grep hello`
- E) `grep hello > file.txt`
- F) `grep hello file.txt | cat`

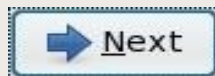




MCQ Question 3

In a valid red black tree with two nodes, how many of them must be red?

- A) 0
- B) 1
- C) 2
- D) 0 or 1
- E) 1 or 2
- F) It can vary depending on how the tree was constructed

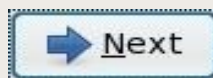




MCQ Question 4

What is the worst case time complexity of the red black tree find operation where N is the number of nodes in the tree?

- A) $O(1)$
- B) $O(\log(\log(N)))$
- C) $O(\log(N))$
- D) $O(N)$
- E) $O(N\log(N))$
- F) $O(N^2)$
- G) $O(2^N)$



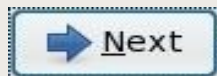


MCQ Question 5

Which of the following will be matched by the following regular expression? Select all that apply

`a*(b|[0-9])+\s*[0-9_]`

- A) bb9
- B) aaaaaaab6 _
- C) ab 7
- D) bbbb_
- E) aaaabbbb 9_

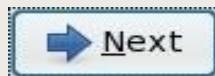




MCQ Question 6

Select all of the following characters that must be escaped in a regular expression

- A) (
- B) [
- C) *
- D) ^
- E) %
- F) ?
- G) +
- H) =
- I) |
- J) \



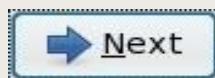
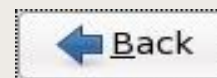


MCQ Question 7

Given the following line in a CSV file, what is the second string that is contained?

`"Mukul,""Joshua","""""Paris in the Spring""""", Seems good",
"Johnson"`

- A) "Joshua
- B) """"Paris in the Spring""""
- C) """"Paris in the Spring""""", Seems good
- D) ""Paris in the Spring"", Seems good
- E) Paris in the Spring"", Seems good
- F) Nothing, there is an error in the CSV file as having three commas without a space is undefined behaviour.

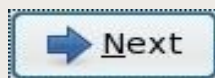
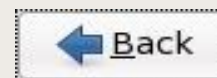




MCQ Question 8

What is the threshold at which an AVL tree needs to have its balance fixed?

- A) 0.5
- B) 1
- C) 1.5
- D) 2

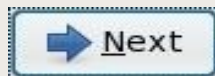




MCQ Question 9

What is correct syntax for setting a variable in a Makefile?

- A) VAR <= 5
- B) VAR := 5
- C) STO VAR 5
- D) set VAR=5
- E) unset Var; export VAR=5
- F) LET VAR=5
- G) ASSIGN VAR TO 5

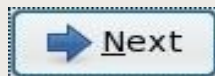




MCQ Question 10

Which of the following will cause bash command B to run if and only if bash command A does not error?

- A) A ; B
- B) A | B
- C) A || B
- D) A && B
- E) A IFTRUE B
- F) A !B

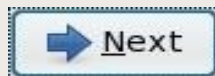




MCQ Question 11

Is bash (on Linux) case sensitive?

- A) Yes
- B) No

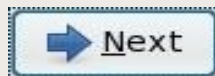




MCQ Question 12

Which of the following is a valid ssh command? Select all that apply. Assume that all usernames are valid, all domains are valid, and all IP addresses are valid.

- A) `ssh username@remote.com`
- B) `ssh username@192.168.0.1`
- C) `ssh remote.com`
- D) `ssh username@192.168.0.1 -p 9090`
- E) `ssh -XC username@192.168.0.1`

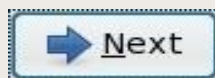
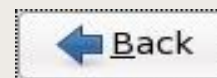




MCQ Question 13

Which of the following commands will list the contents of the /tmp folder? Select all that apply.

- A) `cd /tmp ; ls`
- B) `cd //tmp ; dir`
- C) `pushd /tmp ; dir`
- D) `pushd //tmp ; ls`
- E) `CHDIR //tmp ; DIR`
- F) `ls /tmp`

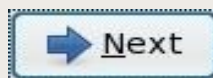




MCQ Question 14

Which of the following is a valid way to run the Junit5.jar jar file and have it test the class BackendDeveloperTests? Note that it will need other files too, which are not mentioned by name.

- A) `java -jar junit5.jar`
- B) `./junit5 --jar -class--select-version=BackendDeveloperTests.`
- C) `java -jar junit5.jar --select-class=BackendDeveloperTests`
- D) `java --jar junit5.jar BackendDeveloperTests`
- E) `java -jar junit5.jar -cp . --select-class=BackendDeveloperTests`

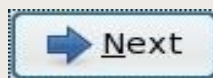
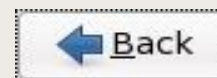




MCQ Question 15

Which of the following is valid syntax for a lambda expression, assuming the `object.runThis` method takes an argument of type `ThisInterface`? (`ThisInterface` contains a single method `public void run(Object e)`). Assume that `someFunction(Object e)` is defined as well.

- A) `object.runThis((e)->someFunction(e));`
- B) `object.runThis(...) -> {someFunction(e)};`
- C) `object.runThis(new ThisInterface(){public void run(Object e){someFunction(e)}};`
- D) `lambda a = (Object e)->someFunction(e);
object.runThis(a);`

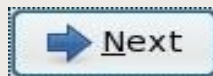




MCQ Question 16

Which of the following are the package managers used by our Ubuntu 22.04 LTS virtual machines? Select all that apply.

- A) dpkg
- B) dnf
- C) yum
- D) pacman
- E) emerge
- F) apt
- G) apk
- H) rpm
- I) yay
- J) snap

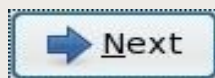
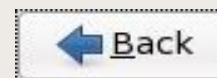




MCQ Question 17

Which of the following is the correct syntax for a directed edge going from A to B in a dot file?

- A) `A => B`
- B) `A -> B`
- C) `addEdge(A, B)`
- D) `edge[A, B]`
- E) `A -- B [Orientation=LTR]`

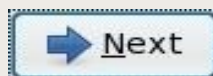




MCQ Question 18

Why will JavaFX code not run on the Google Cloud VM?

- A) The Google Cloud VM runs Linux, and JavaFX does not run Linux
- B) JavaFX requires X11, and the cloud VM does not have that installed
- C) JavaFX has issues running on low spec computers such as the Free tier of Google Cloud

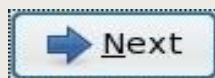
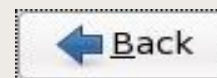




MCQ Question 19

When using the text editor `vim`, which key sequence is used to format code?

- A) `ctrl-shift-f`
- B) `F`
- C) `ggVG=`
- D) `gIOnHu`
- E) `gg=BG=o<ESC>IOPP`
- F) `GGRIPNORE`

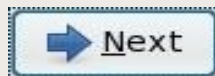




MCQ Question 20

When using the **emacs** text editor, which key sequence is used to exit?

- A) `ctl-q`
- B) `ctrl-w`
- C) `alt-f4`
- D) `ctrl-x ctrl-c`

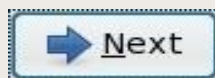
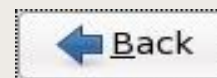




MCQ Question 21

Which of the following commands will bring you to the previous directory (in effect, undoing a cd)

- A) cd
- B) cd -
- C) cd ..
- D) cd .
- E) cd ~
- F) cd /
- G) cd //
- H) cd ../..
- I) cd %

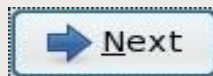




MCQ Question 22

In a Makefile, what target is run by default when no arguments are given to the **make** command

- A) the target named **default**
- B) the first target encountered in the file
- C) the last target encountered in the file
- D) the target named **main**
- E) It depends on an environment variable



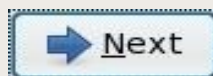


MCQ Question 23

Which of the following will match the following regular expression? Select all that apply

```
[A-Z#a-z#0-9]+\s+(([a-z]+)|([A-Z]+))%\(.*\);
```

- A) AAAA aabb%();
- B) Ab09###999 bbA%();
- C) deez#nuts420 AcB ();
- D) ccccccc AbA%();
- E) ccccccc ABA%();



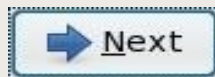


MCQ Question 24

Which of the following regular expressions will match a date in the following format? Select all that apply

YYYY-MM-DD

- A) `[0-9][0-9][0-9][0-9]-[0-9][0-9]-[0-9][0-9]`
- B) `(\d\d){4}(-\d\d){2}`
- C) `\d{4}(-\d{2}){2}`
- D) `(\d\d){2}(-\d\d){2}`
- E) `([0-9][0-9]\d\d)(-|-)\d[0-9](-|-)\d\d`
- F) `\d\d\d\d\\-\d\d\\-\d\d`

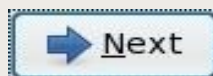




MCQ Question 25

Which of the following statements are true about red black trees? Select all that apply

- A) A red black tree is a type of Binary Search Tree
- B) Red Black trees rely on a rotate algorithm in order to self balance
- C) Red black trees have $O(N)$ worst case insertion time



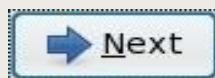
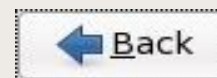


MCQ Question 26

In a hashtable using chaining, where the hash function is the number of letters in the key string, how many hash collisions are produced after inserting the following strings, and assuming a backing array of size six?

"algorithm", "dijkstra", "bellman-ford", "four", "five",
"Nine"

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4
- F) 5
- G) 6



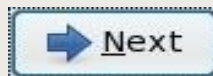


MCQ Question 27

In a hash table using open addressing with a linear probe to handle hash collisions, where the hash function is the number of letters in the key string, how many hash collisions are produced after inserting the following strings, and assuming a backing array of size six?

"five", "four", "nine", "algorithm", "dijkstra", "bellman-ford"

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4
- F) 5
- G) 6

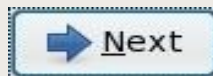




MCQ Question 28

Which of the following commands is used to compile java code?

- A) java
- B) javac
- C) javacompile
- D) gcc
- E) g++
- F) clang
- G) clang++
- H) cargo
- I) jcomp
- J) junit

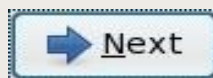
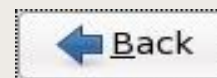




MCQ Question 29

When using a hashtable, and using open addressing with a linear probe to handle hash collisions, which of the following is the worst case time complexity of the insert operation?

- A) $O(1)$
- B) $O(\log(N))$
- C) $O(N)$
- D) $O(N^2)$
- E) $O(N^3)$
- F) $O(2^N)$

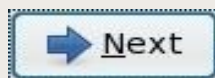




MCQ Question 30

Do java classes have to start with a capital letter

- A) yes
- B) no

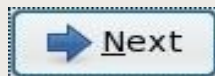




MCQ Question 31

Which of the following git commands can be used to move local commits to a remote repository?

- A) git add
- B) git commit
- C) git push
- D) git pull
- E) git fetch
- F) git revert
- G) git rebase
- H) git merge
- I) git diff
- J) git status

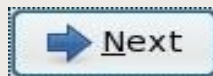




MCQ Question 32

Which of the following git commands can be used to show a summary of all the specific lines of code that have changed since the last commit?

- A) git add
- B) git commit
- C) git push
- D) git pull
- E) git fetch
- F) git revert
- G) git rebase
- H) git merge
- I) git diff
- J) git status

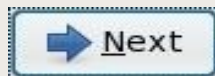




MCQ Question 33

Which of the following git commands can be used to show a quick summary of what files have been modified?

- A) git add
- B) git commit
- C) git push
- D) git pull
- E) git fetch
- F) git revert
- G) git rebase
- H) git merge
- I) git diff
- J) git status

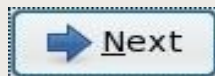




MCQ Question 34

Is Gary Dahl bald? (Opinion)

- A) Yes
- B) No
- C) Mukul

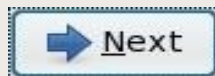




MCQ Question 35

When doing a git pull with pull.rebase set to false, what action will git perform upon finding commits in the remote repository that are not in the local copy?

- A) rebase
- B) reconfigure
- C) merge
- D) abort
- E) unify

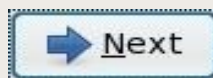




MCQ Question 36

Which of the following methods are required to be present in a class that extends the abstract class Number? Select all that apply.

- A) `getAsDouble()`
- B) `doubleValue()`
- C) `getAsInt()`
- D) `intValue()`
- E) `getWeight()`

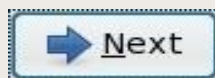
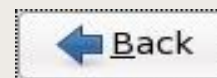




MCQ Question 37

When doing radix sort on an array of integers between 10 and 999999, how many rounds of counting sort (with base 10) must be performed at a minimum in order to sort the array?

- A) 1
- B) 2
- C) 3
- D) 4
- E) 5
- F) 6
- G) 7

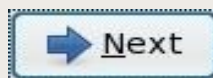




MCQ Question 38

When using JavaFX, what class does your code need to extend in order to be able to present the interface to the user?

- A) AbstractWindow
- B) Window
- C) Application
- D) AbstractApplication
- E) JavaFXGUI
- F) FXWindow
- G) JFrame
- H) JPanel
- I) None - it should just call JavaFX methods instead

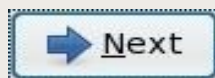
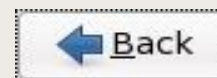




MCQ Question 39

What is the time complexity of the rotate method in a Binary Search Tree where N is the number of nodes?

- A) $O(1)$
- B) $O(\log(N))$
- C) $O(N)$
- D) $O(N^2)$



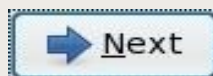


MCQ Question 40

Complete the following snippet of code that is being used in the rehash method of a Hashtable. Replace the <CODEHERE> with the correct option. Assume that a hash with no possible collisions is used.

```
for(int i = 0; i < array_old.length; i++)  
    if(array_old[i]!=null)  
        array[<CODEHERE>] = array_old[i];
```

- A) i
- B) array.length-i-1
- C) i + array_old[i].hashCode()
- D) array_old[i].hashCode() % array.length();
- E) i + array_old[i].hashCode() % array.length();

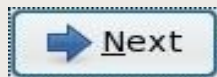
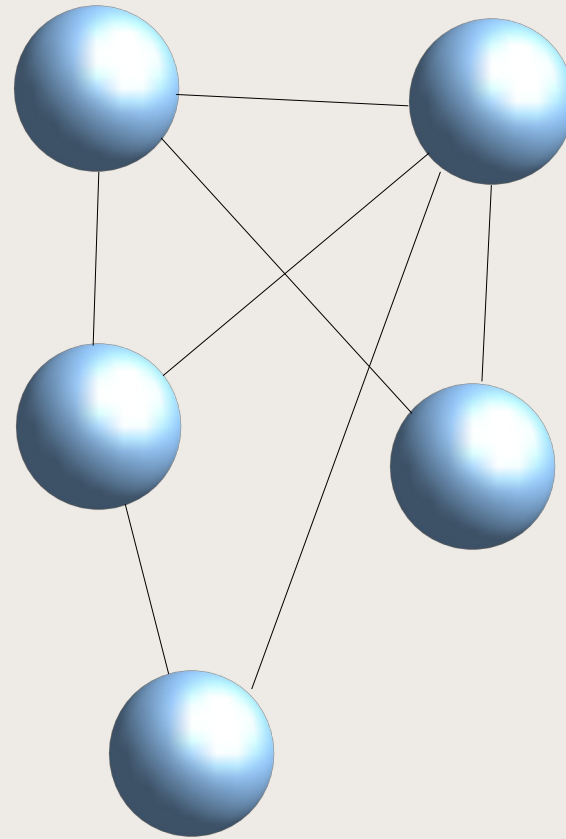




MCQ Question 41

How many nodes are in the following graph?

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4
- F) 5

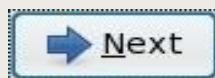
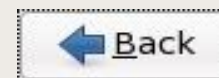
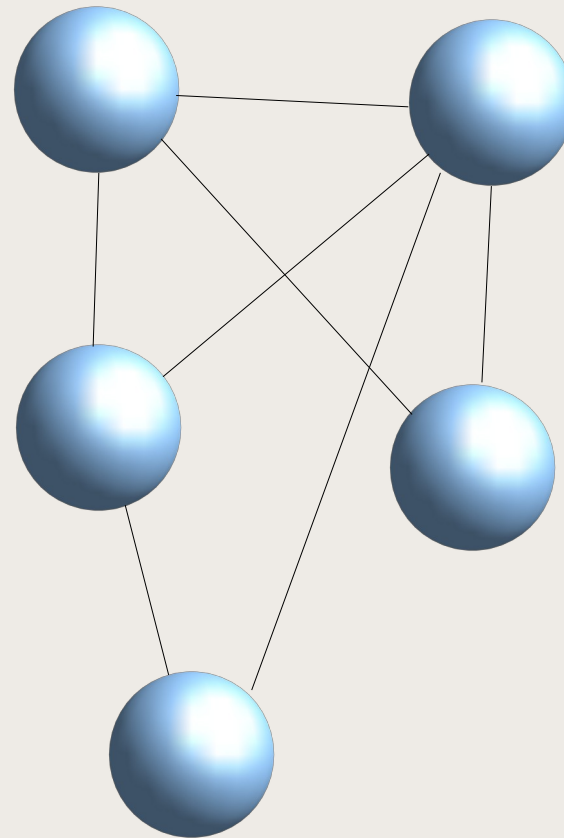




MCQ Question 42

How many edges are in the following graph?

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4
- F) 5
- G) 6
- H) 7
- I) 8
- J) 9
- K) 10

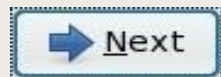
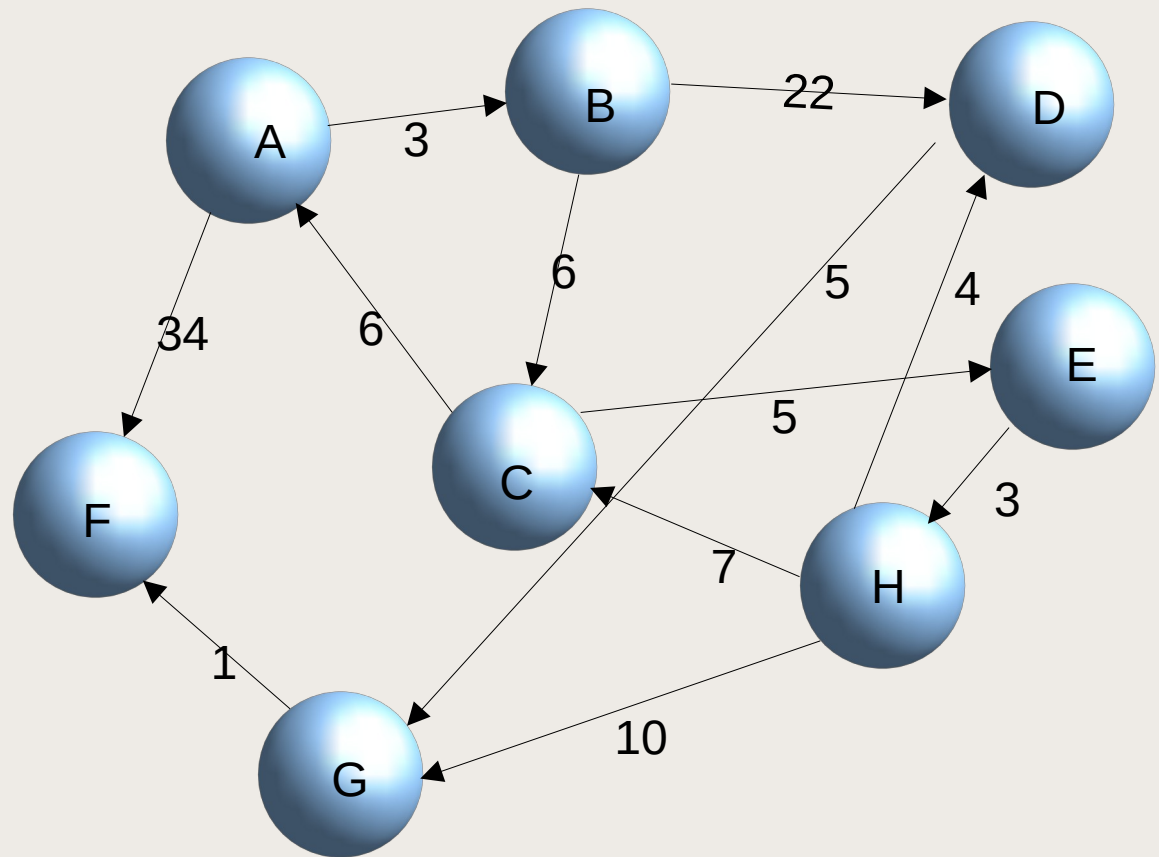




MCQ Question 43

Given the following graph, what is the cost of the shortest path from node A to node F

- A) 17
- B) 27
- C) 28
- D) 34
- E) 47

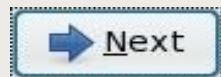
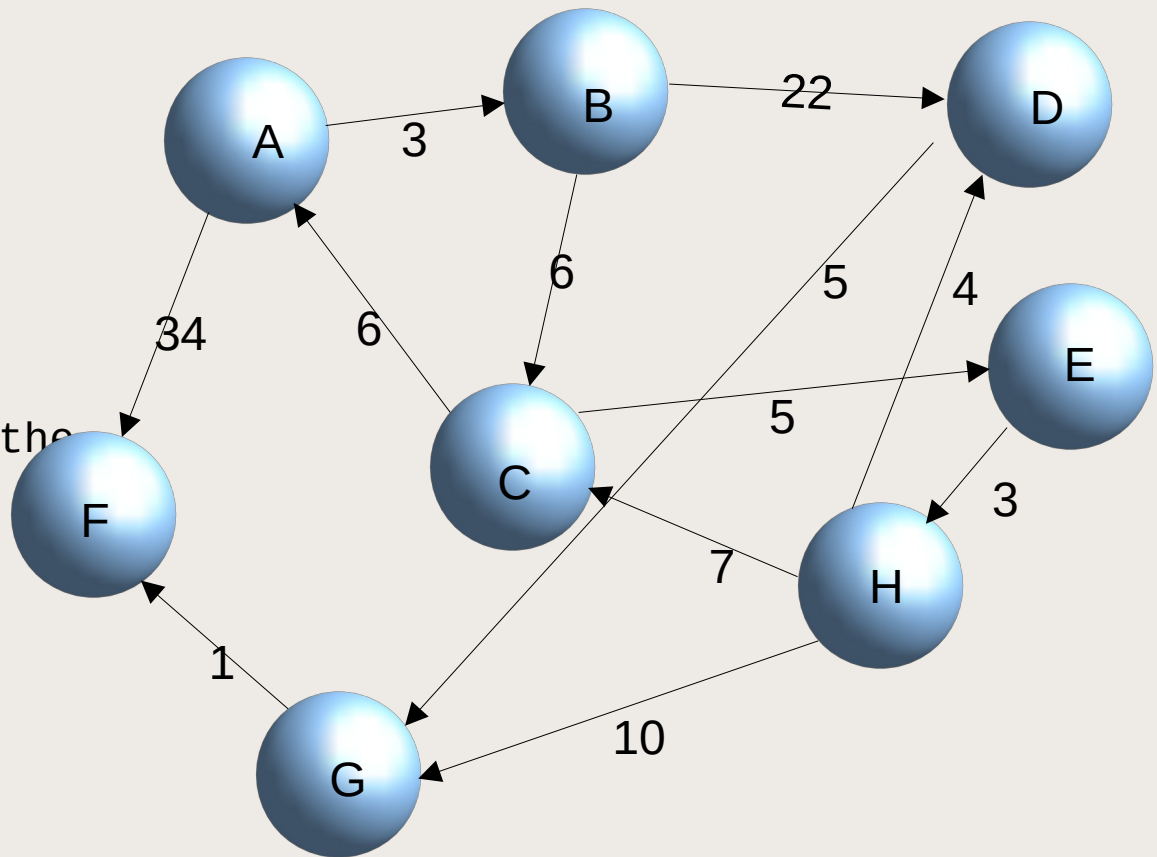




MCQ Question 44

Given the following graph, what nodes are included in the shortest path (by cost) from A to F?

- A) AF
- B) ABCHGF
- C) ABDGF
- D) ABCEHGF
- E) ABCEHDGF
- F) None of the above

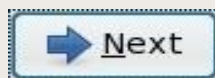
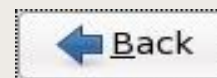




MCQ Question 45

When using Junit, what additional argument is required to allow the use of a test class that does not end in "Tests" (without the quotes)

- A) --force
- B) --change-regex=all
- C) -n ".*"
- D) --override-force
- E) -pn=all --force
- F) -f

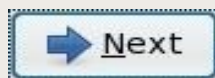
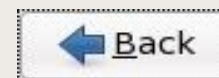
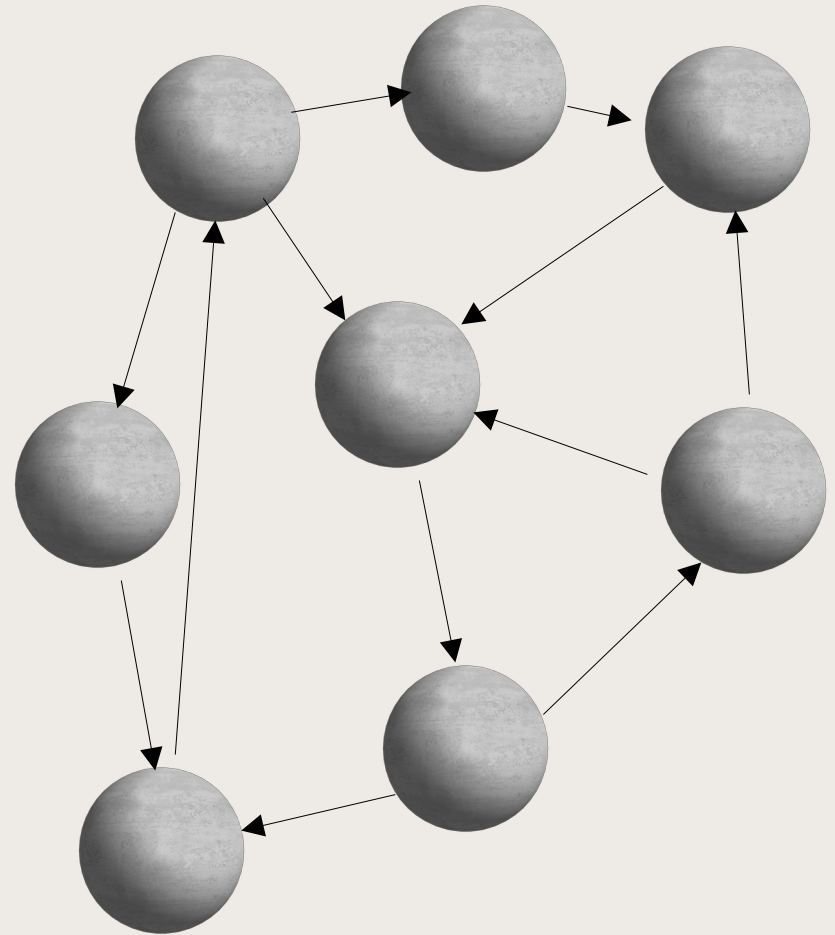




MCQ Question 46

Is the following graph directed, or undirected?

- A) Directed
- B) Undirected

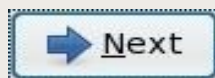
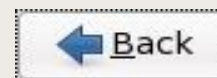




MCQ Question 47

When using a Priority Queue, what data structure usually backs the queue?

- A) Linked List
- B) Array
- C) ArrayList
- D) Heap
- E) Red Black Tree

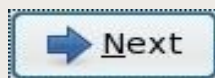
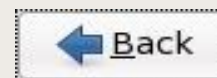




MCQ Question 48

Which of the following is the time complexity of Prim's algorithm, given that V is the number of vertices and E is the number of edges?

- A) $O(V)$
- B) $O(V+E)$
- C) $O((V+E)\log(V))$
- D) $O((V+E)\log(E))$
- E) $O(V^2E^2\log(V+E))$

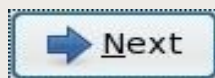
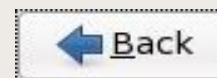




MCQ Question 49

Which of the following algorithms can be used to build a minimum spanning tree? Select all that apply

- A) Dijkstra's algorithm
- B) Prim's algorithm
- C) Bellman-Ford algorithm
- D) Floyd-Warshall algorithm
- E) Kruskal's algorithm
- F) Greedy algorithm

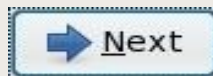




MCQ Question 50

In the vim editor, what is the command used to globally replace the word **cat** with **dog**?

- A) `s/e/x cat -> dog`
- B) `s/cat/dog`
- C) `:s/cat/dog`
- D) `:%s/cat/dog/g`
- E) `:s/cat/dog/g`
- F) `:grep cat:rpl dog`
- G) You cannot, and must use an external command like **sed** or **awk** to do so

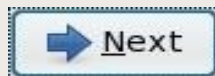




MCQ Question 51

Which of the following is true about the black height of the a valid red black tree? Select all that apply

- A) The black height is the same for any black node
- B) Red nodes add zero to the black height, and black nodes add one
- C) Black nodes add zero to the black height, and red nodes add one
- D) Every black node has a red node that has the same black height as itself.
- E) The black height to any black nil node is the same.

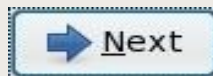




MCQ Question 52

Which of the following is true about a valid red black tree? Select all that apply.

- A) The root node must always be black
- B) The root node can either be black or red
- C) It is possible for a node to have one black and one NIL child.
- D) Red nodes must have two black children
- E) There are NIL nodes as the children of every leaf node in the tree (some may consider these to be the real leaf nodes)

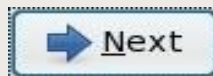




MCQ Question 53

Which of the following is true about a valid red black tree? Select all of them.

- A) The longest possible path in a red black tree with a set black height will alternate between red and black nodes
- B) It is possible for a red node to have a red child
- C) It is possible for a node to have only one non-Nil child
- D) All nodes have only 0 or 2 non NIL children
- E) The space complexity of at Red Black Tree is $O(N)$
- F) The time complexity of Red Black Tree insertion is at worst $O(N)$ because a chained set of rotations can involve all nodes.



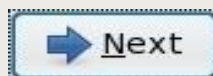
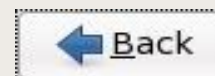


MCQ Question 54

Which of the following will be the array contents after one pass of counting sort on the 1s place?

Array = {10, 11, 20, 55, 41, 62}

- A) {10, 11, 20, 41, 55, 62}
- B) {10, 20, 11, 41, 62, 55}
- C) {10, 11, 20, 55, 41, 62}
- D) {10, 20, 11, 55, 62, 41}
- E) All of the above are possible, depending on how the sort is implemented. They are equally correct
- F) None of the above are possible.

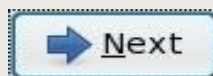




MCQ Question 55

Which of the following correctly gives the time complexity of Radix Sort. Assume that N is the number of elements in the input array, and K is the number of digits in the largest number in the array?

- A) $O(1)$ (It's a very fast sort)
- B) $O(N)$
- C) $O(K)$
- D) $O(NK)$
- E) $O(N \log N)$
- F) $O(N \log K)$
- G) $O(NK^2)$
- H) $O(2^{(NK)})$

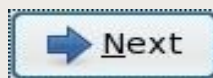
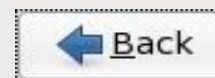




MCQ Question 56

Which of the following is a feature of a good hash function (for use in a hash table, not a cryptographic hash)?
Select all that apply.

- A) The hash function produces the same output for the same input
- B) The hash function is computationally intensive
- C) The output of the hash function is roughly uniform across the entire range of possible outputs
- D) The hash function rarely produces the same output for different inputs
- E) The hash function produces outputs in a small range (less than 100)

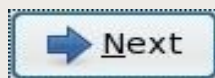
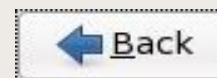




MCQ Question 57

What is the main advantage of using quadratic probing over linear probing when creating a hash table with open addressing?

- A) Quadratic probing is less computationally intensive
- B) Quadratic probing minimizes hash collisions
- C) Quadratic probing spaces nodes more evenly throughout the backing array
- D) Quadratic probing causes the backing array to fill up slower, as it removes the need for sentinel values
- E) None of the above

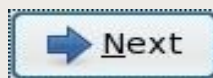
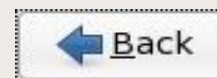




MCQ Question 58

In which of the following situations would a sentinel value be added to the backing array of a hashtable that handles hash collisions using open addressing with a linear probe?

- A) Insertion into the hashtable
- B) Removal of a node from the hashtable
- C) Performing the find operation from a hashtable
- D) Expanding the backing array and rehashing elements
- E) All of the above
- F) None of the above

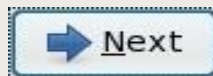




MCQ Question 59

What are the advantages of using chaining (using a red black tree) instead of open addressing with a linear probe in a hashtable? Select all that apply.

- A) Less memory used, as sentinel nodes do not have to be stored in the backing array
- B) Faster access, with a worst case of $O(\log(N))$ instead of $O(N)$
- C) Fewer hash collisions, as open addressing can cause a chain of hash collisions in the same area
- D) None of the above options are correct

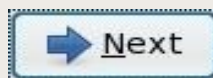




MCQ Question 60

Which of the following are valid strategies for handling hash collisions in a hashtable? Select all that apply.

- A) Open addressing with a linear probe
- B) Open addressing with a quadratic probe
- C) Using two hash functions and switching between them if collisions occur
- D) Using a linked list to store chains of nodes that hashed to the same value
- E) Doubling the size of backing array if a collision occurs, and putting the new node in the second half at double the index of the first node

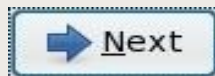




MCQ Question 61

In class, what was the load factor that we rehashed at?

- A) 10%
- B) 20%
- C) 30%
- D) 40%
- E) 50%
- F) 60%
- G) 70%
- H) 80%
- I) 90%
- J) Never, we used Open addressing with a linear probe, and the means you never have to rehash

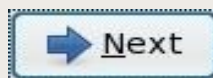




MCQ Question 62

In which of the following conditions will sentinel values (dummy nodes) be removed from the backing array of a hash table that uses chaining to resolve hash collisions?

- A) During node insertion
- B) During node removal
- C) During node find operation
- D) During the rehash and expand operation
- E) Never, such a hashtable does not need sentinel values.

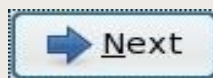
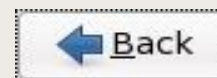




MCQ Question 63

If a hash function is considered perfect, which of the following is true about it? Select all that apply.

- A) For every output, there is one, and exactly one, input that will cause that output
- B) For a set of strings with a known maximum length, it is possible to create such a hash function
- C) For a set of strings with unknown maximum length, it is possible to create such a hash function
- D) None of the above are true.

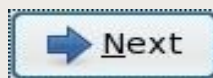
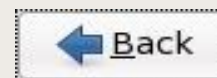




MCQ Question 64

What is the worst case time complexity for the remove operation of a hash table that uses chaining with a red black tree to handle hash collisions? (N is the number of nodes in the hash table)

- A) $O(1)$
- B) $O(2)$
- C) $O(\log(N))$
- D) $O(N)$
- E) $O(N\log(N))$
- F) $O(N^2)$

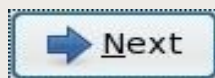
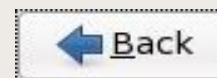




MCQ Question 65

What is the worst case time complexity for the remove operation of a hash table that uses chaining with a linked list to handle hash collisions? (N is the number of nodes in the hash table)

- A) $O(1)$
- B) $O(2)$
- C) $O(\log(N))$
- D) $O(N)$
- E) $O(N\log(N))$
- F) $O(N^2)$

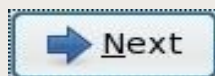




MCQ Question 66

Which of the following (GNU) tar commands will be able to extract a tar.gz or tgz file? Select all that apply.

- A) `tar -cvf files.tar`
- B) `tar -cvzf files.tar`
- C) `tar -xvf files.tar`
- D) `tar -xvzf files.tar`
- E) `tar -xzf files.tar`
- F) `tar files.tar`
- G) `tar unzip files.tar`
- H) `unzip files.tar`

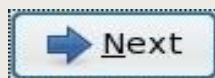
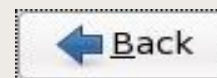




MCQ Question 67

Which of the following bash commands will print the absolute path of the current working directory? Select all that apply.

- A) `pwd`
- B) `pwd -P`
- C) `echo $PWD`
- D) `getdir .`
- E) `getd .`
- F) `getd`

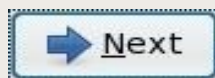
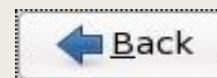




MCQ Question 68

Which of the following symbols refers to a user's home directory?

- A) -
- B) +
- C) =
- D) ^
- E) .
- F) ..
- G) /
- H) None of the above

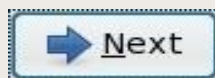
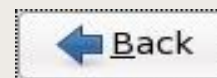




MCQ Question 69 (Nice)

What is the default location for a user's home directory on Linux? (the user has username gary)

- A) C:\Users\gary\
B) /Users/gary/
C) /var/run/user/gary
D) /home/gary
E) /var/home/gary
F) /var/www/html
G) /public/ftp/gary

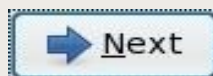




MCQ Question 70

Which of the following git commands will make a commit with the message "adding log file"? Assume that the changes have already been staged.

- A) `git write "adding log file"`
- B) `git commit "adding log file"`
- C) `git commit -m "adding log file"`
- D) `git commit -message="adding log file"`
- E) None of the above are correct

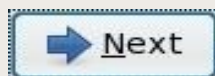




MCQ Question 71

Which of the following is true about a Makefile? Select all that apply

- A) Only tabs may be used for indentation
- B) Makefiles share many commands with the bourne shell.
- C) Makefiles use a variant of javascript internally as a scripting language
- D) None of the above are correct

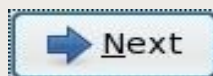




MCQ Question 72

In a Makefile, when do the commands contained within a target get run? Select all that apply.

- A) When the target name is a file that does NOT exist
- B) When the target name is a file that DOES exist
- C) When the target name is a file that has a timestamp OLDER than the dependencies
- D) When the target name is a file that has a timestamp NEWER than the dependencies
- E) Never

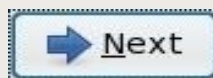
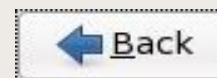




MCQ Question 73

Which of the following is NOT a black box test? Select all that apply.

- A) When testing radix sort, checking after every iteration of counting sort to make sure the array has the correct values in the right places
- B) In a red black tree, using a method to get an iterator to iterate over all nodes in the tree in order
- C) Calling `hashtable.getKeySet()` and iterating it to determine if it contains the right keys
- D) None of the above; all are valid black box tests

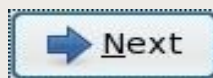




MCQ Question 74

Which of the following will cause a JUnit test to return false? Select all that apply.

- A) Throwing an exception
- B) Returning true
- C) Returning false
- D) Setting the `_instance` field to null
- E) Failing an assert
- F) Having a blank method

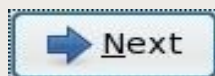




MCQ Question 75

What annotation must be present immediately before EACH JUnit test method?

- A) `@BeforeEach`
- B) `@BeforeAll`
- C) `@Test`
- D) `@Assertions.import("Test")`
- E) `@SuppressWarnings("Unchecked")`
- F) None of the above

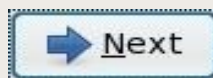




MCQ Question 76

What methods from the Junit jar file can be used to check if a thrown exception is of the right type? Select all that apply.

- A) Catching Exception and using the **instanceOf** keyword to check the class
- B) Catching Exception and using the **is** keyword keyword to check the class
- C) Using Reflection to check the class hierarchy
- D) `assertThrows`
- E) `AssertEquals` with the caught exception and a new exception of the right type

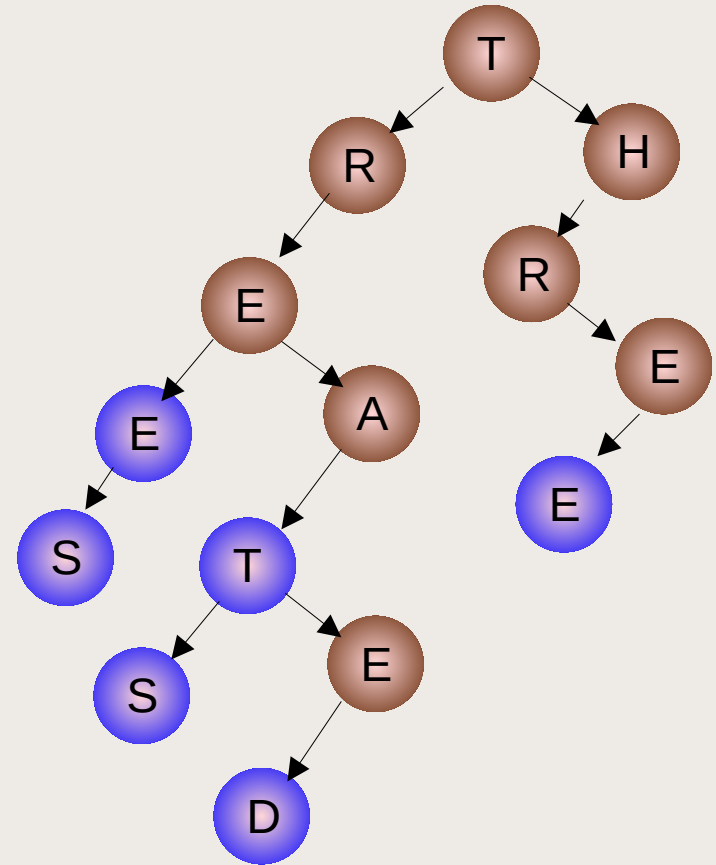




MCQ Question 77

How many words are stored in the following trie?

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4
- F) 5
- G) 6
- H) 7
- I) 8
- J) 9

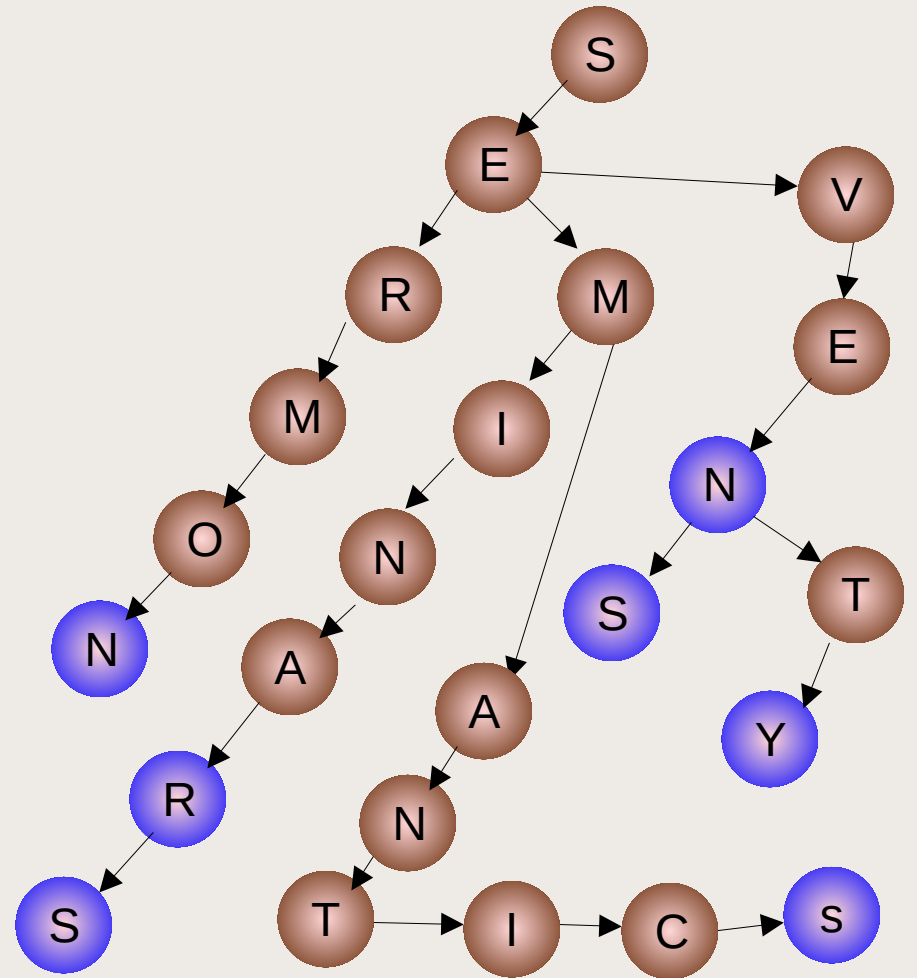




MCQ Question 78

How many nodes must be added to the following trie to insert the word "Seminal"

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4
- F) 5
- G) 6
- H) 7
- I) 8
- J) 9

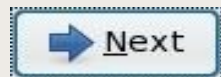
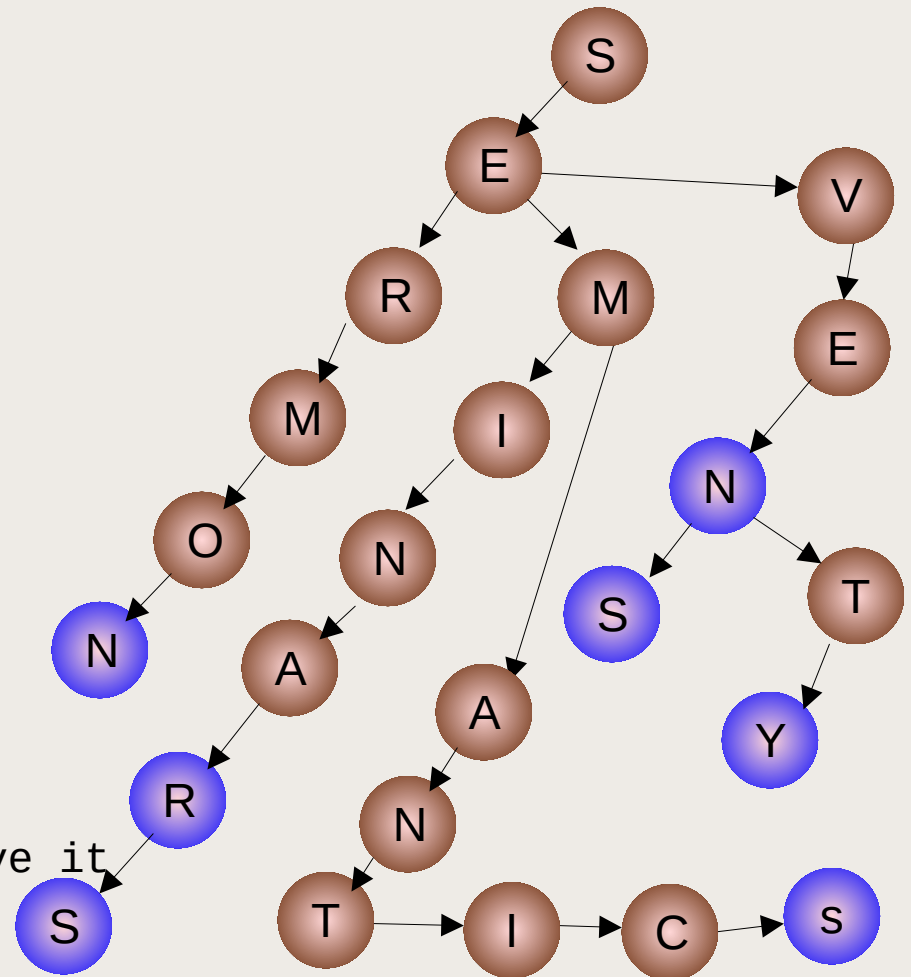




MCQ Question 79

How many nodes need to be removed from the following trie in order to remove the word Semantic?

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4
- F) 5
- G) 6
- H) 7
- I) 8
- J) It's not in the Trie so you can't remove it

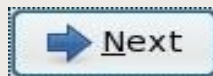




MCQ Question 80

What is the time complexity of a Trie? Note that all operations have the same time complexity.

- A) $O(N)$, where N is the number of nodes stored in the Trie
- B) $O(\log(N))$, where N is the number of nodes stored in the Trie
- C) $O(N)$, where N is the number of nodes in the input string
- D) $O(\log(N))$, where N is the number of nodes in the input string
- E) None of the above

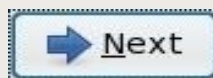
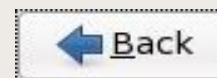




MCQ Question 81

Which of the following is usually implemented recursively?

- A) Red black tree fixing operation for insertion
- B) Dijkstra's algorithm
- C) Kruskal's algorithm
- D) Prim's algorithm
- E) Depth first search
- F) Breadth first search
- G) None of the above; all are impossible to do recursively and must be done iteratively



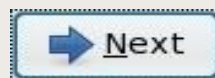


MCQ Question 82

Does the following adjacency matrix represent a directed, or undirected, graph? (column is source, row is target)

- A) Directed
- B) Undirected
- C) Either is fine; the adjacency matrix is missing information anyway.

◇	A	B	C	D
A		5		3
B	4			4
C	7	6		
D			9	





MCQ Question 83

What algorithm is implemented by the following snippet of pseudocode?

```
Define foo(visited, node, end):
```

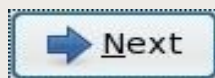
```
    If visited[node]: Return
```

```
    If node==end: //Found end
```

```
    For V in node.pathsLeaving: If not visited[V]:  
        foo(visited, V, end)
```

```
    Return
```

- A) Dijkstra's algorithm
- B) Breadth first search
- C) Depth first search
- D) Prim's algorithm

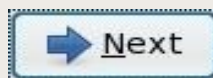




MCQ Question 84

Calling which of the following functions will cause a JavaFX event to stop "bubbling" up the tree?

- A) `event.consume()`
- B) `event.remove()`
- C) `event.delete()`
- D) `event.suck()`
- E) `event.die()`
- F) `event.murder()`
- G) `JavaFXUtils.setEventOptions(event, FX.DELETE_EVENT)`

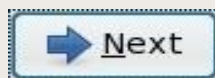
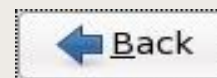




MCQ Question 85

If an undirected graph has seven nodes, how many edges will be in the minimum spanning tree of that graph?

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4
- F) 5
- G) 6
- H) 7
- I) 8
- J) You can't tell because the graph might not be fully connected



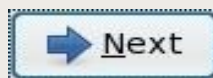
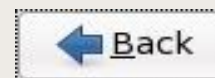


MCQ Question 86

Which of the following algorithms is represented by the following rough Java code?

- A) Dijkstra's algorithm
- B) Breadth first traversal (BFS)
- C) Depth first traversal (DFS)
- D) Prim's algorithm
- E) Dahl algorithm

```
public void foo(Node start, HashSet<Node> visited){
    Stack<Node> q = new Stack();
    visited.add(start);
    q.push(start);
    while(!q.isEmpty()){
        Node n = c.pop();
        visited.add(n);
        for(var v : n.edgesLeavingDestinations){
            if(!visited.contains(v))
                q.push(n);
        }
    }
}
```

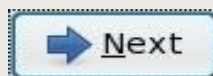




MCQ Question 87

Which of the following algorithms is used to build a minimum spanning tree, and works by considering all edges in increasing order of weights, and by connecting previously unconnected sets of nodes?

- A) Dijkstra's algorithm
- B) Prim's algorithm
- C) Kruskal's algorithm
- D) Depth first search
- E) Breadth first search
- F) Weighted Breadth first search
- G) Bellman-Ford
- H) Floyd Warshall

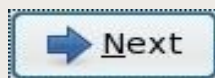
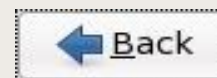




MCQ Question 88

What does HTML stand for?

- A) Human Though Machine Learning
- B) Hyper Text Markup Language
- C) Hypet Text Markdown Language
- D) None of the above are correct

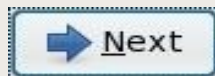




MCQ Question 89

When using html, where do meta tags go?

- A) Outside the `<html></html>` tags
- B) Just inside the `<html>` tag at the top of the file
- C) In the head section
- D) In the body section
- E) In the resource fork of the file
- F) In the footer at the bottom of the file

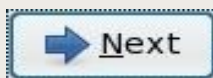
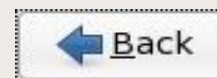




MCQ Question 90

What is the name of the web server we were taught to use in class?

- A) wserv
- B) apache
- C) apache2
- D) nginx
- E) ubuntu
- F) google cloud

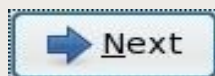




MCQ Question 91

Where are files accessible via the cgi interface found?

- A) /var/www/html/
- B) /usr/lib/cgi-bin/
- C) /home/\$USER/cgi/bin/
- D) /usr/lib/cgi/
- E) /usr/lib64/cgi/bin/
- F) /var/www/cgi-bin/
- G) /var/serv/cgi/
- H) /var/www/
- I) /var/
- J) /afs/

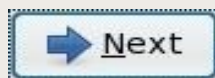
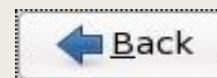




MCQ Question 92

What location are pages served from by default when using the apache2 web server?

- A) ~/public/html
- B) /var/www/html
- C) /html
- D) /var/
- E) /www
- F) /server
- G) Nowhere, there is no default path

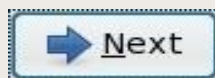
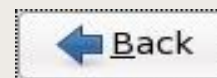




MCQ Question 93

What javascript function is used to call a cgi script?

- A) call
- B) fastcall
- C) bcall
- D) fetch
- E) gettext
- F) jQuery.find
- G) None, you need to use TCP and sockets

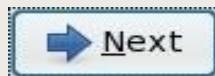




MCQ Question 94

How are command line arguments passed to java programs?

- A) Through the special file called stdin
- B) Through reading from a Scanner on System.in
- C) In the String[] args in the main method
- D) All of the above
- E) None of the above

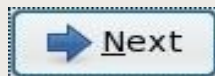




MCQ Question 95

How many children can a node have in a 234 tree? Select all that apply.

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4
- F) 5
- G) 6
- H) 7
- I) 8
- J) 234 trees don't have nodes or children

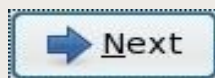
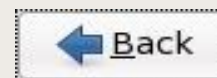




MCQ Question 96

In a 234 tree, what is the maximum number of values that can be contained in any given node?

- A) 1
- B) 2
- C) 3
- D) 4
- E) 5
- F) 6
- G) 7

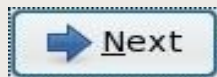
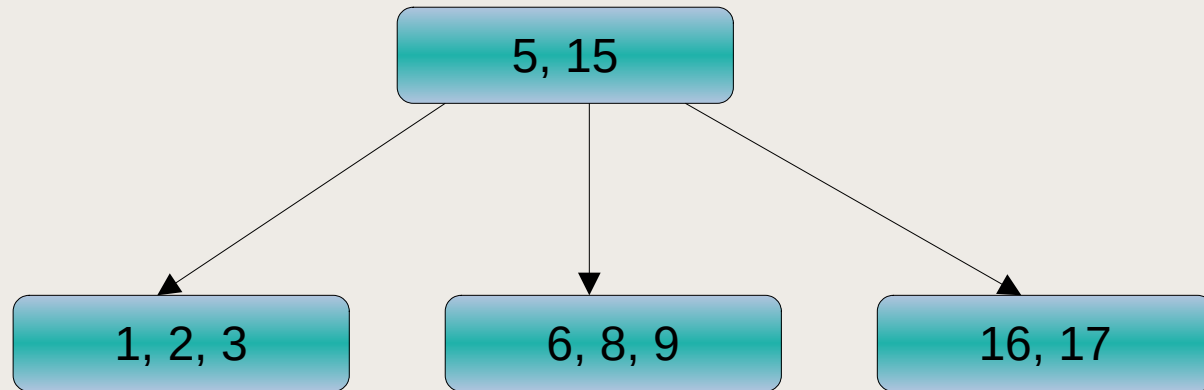




MCQ Question 97

What is the middle value of the root node after performing an insert of value 7 on the following 234 tree?

- A) 1
- B) 2
- C) 3
- D) 5
- E) 6
- F) 7
- G) 8
- H) 9
- I) 15
- J) 16
- K) 17

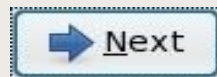
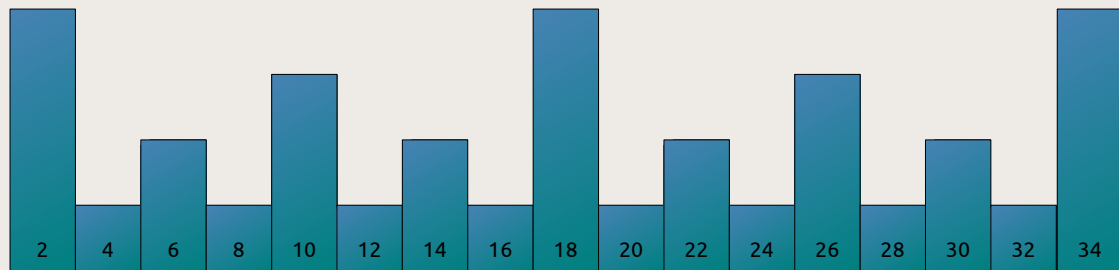




MCQ Question 98

In the following skip list, which nodes are compared against 17 during a find operation? Select all that apply

- A) 6
- B) 8
- C) 10
- D) 12
- E) 16
- F) 18
- G) 24
- H) 26
- I) 34

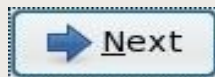
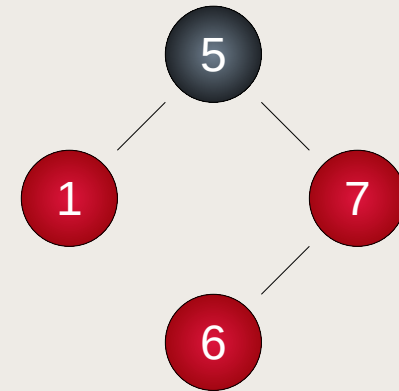




MCQ Question 99

What case is represented by the following red black tree violation? This is after an insert operation has just been performed, adding the node with value 6.

- A) 1
- B) 2
- C) 3
- D) 4
- E) 5
- F) 6

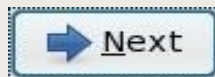
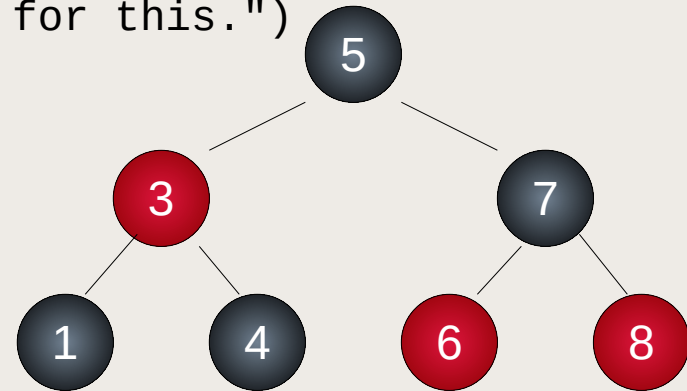




MCQ Question 100

What is the black height of the node 1 in the following red black tree? The root has black height 0. (Note: Here "Black Height" is what is properly known as "Black depth. Pretend they're the same for this.")

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4
- F) 5



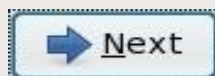


MCQ Question 101

Which of the following will match this regular expression?
Select all that apply

`(([asg]+)|([0-8]+)){2}`

- A) asg000
- B) asg
- C) as
- D) a
- E) 90
- F) 007



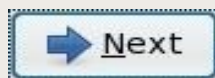
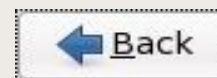


MCQ Question 102

Which of the following will match this regular expression?

`\d`

- A) 0
- B) 09
- C) 123
- D) 1234
- E) 12345
- F) abc
- G) ab1c

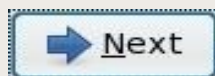




MCQ Question 103

Which of the following goes at the top of a CGI bash script? Select all applicable options

- A) `#!/bin/bash`
- B) `#!/usr/bin/env bash`
- C) `#!/bin/sh`
- D) `#include <stdio.h>`
- E) `#define MACRO value`
- F) `#!/cgi-bin/init`

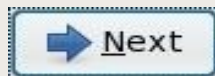




MCQ Question 104

Which of the following is the difference between **let** and **var** in javascript?

- A) The keyword **let** defines a constant, while **var** defines a variable
- B) The keyword **var** defines a global variable, while **let** defines a local variable
- C) They do the same thing
- D) Variables defined with **let** are constrained to their normal scope, while **var** allows access throughout the entire function
- E) The keyword **let** is deprecated and should not be used

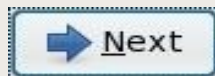




MCQ Question 105

Hashtables can contain duplicate keys.

- A) True
- B) False

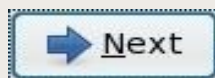
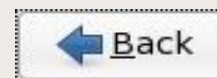




MCQ Question 106

Hashtables can contain duplicate values.

- A) True
- B) False

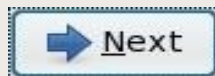




MCQ Question 107

What is the time complexity for inserting at the end of a doubly linked list with a tail reference?

- A) $O(1)$
- B) $O(\log(N))$
- C) $O(N)$
- D) $O(N^2)$
- E) $O(N^3)$

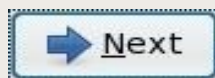
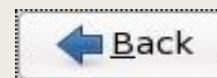




MCQ Question 108

What is the time complexity for inserting at the end of a singly linked list without a tail reference?

- A) $O(1)$
- B) $O(\log(N))$
- C) $O(N)$
- D) $O(N^2)$
- E) $O(N^3)$

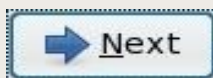
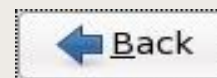




MCQ Question 109

Which Linux command is used to change ownership of a file?

- A) chown
- B) chmod
- C) mkown
- D) filemod
- E) None of the above

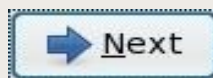
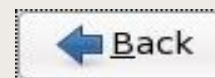




MCQ Question 110

Which Linux command is used to elevate privileges to root?
Select all that apply.

- A) su
- B) bash
- C) sudo
- D) chmod
- E) chown
- F) None of the above

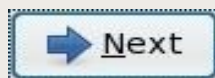
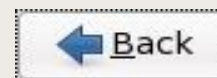




MCQ Question 111

Which Linux command is used to make **script.sh** executable by the owner (file is owned by a group the owner is in)?
Select all that apply.

- A) `chmod 777 script.sh`
- B) `chmod 666 script.sh`
- C) `chmod +x script.sh`
- D) `chmod -x script.sh`
- E) `chmod 766 script.sh`
- F) `chmod 677 script.sh`
- G) `chmod 600 script.sh`
- H) `chmod 711 script.sh`
- I) `chmod 500 script.sh`

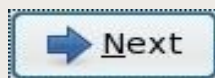
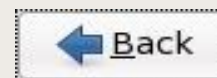




MCQ Question 112

Which of the following CSS selector will match all elements?

- A) .
- B) *
- C) .classname=all
- D) RFD
- E) None of the above

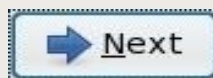
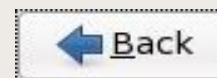




MCQ Question 113

Which lines have an error in the following CSS code? Select all that apply.

- A) `body {`
- B) `background-color: Black`
- C) `color: Black`
- D) `font-family: Ariel`
- E) `//color:Gold`
- F) `}`
- G) None of the above

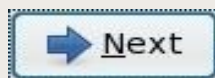
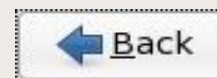




MCQ Question 114

Which javascript function can be used to get a list of HTML elements? Select all that apply.

- A) `document.getData(...)`
- B) `document.querySelectorAll(...)`
- C) `document.search(...)`
- D) `document.queryData(...)`
- E) None of the above are valid.

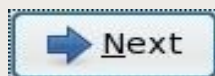




MCQ Question 115

Which of the following html tags are self closing? Select all that apply

- A) a
- B) b
- C) p
- D) input
- E) img
- F) meta
- G) body
- H) None of the above

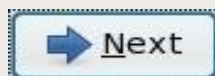




MCQ Question 116

Which of the following roles was responsible for writing the Makefile in our projects?

- A) AlgorithmEngineer
- B) DataWrangler
- C) BackendDeveloper
- D) FrontendDeveloper
- E) They all cooperated
- F) None of the above

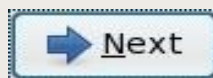
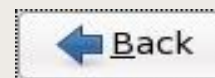




MCQ Question 117

What is the worst case time complexity of insertion into a normal (NOT red black) BST?

- A) $O(1)$
- B) $O(\log(N))$
- C) $O(N)$
- D) $O(N^2)$
- E) None of the above





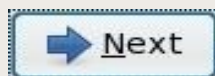
MCQ Question 118

What is the output of the following command? Note that there is a newline in there.

```
echo "NTH2
```

```
55" | tac
```

- A) NTH2
55
- B) 55
NTH2
- C) NTH255
- D) N5TH52
- E) None of the above



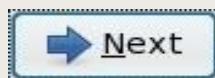
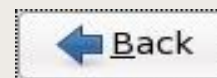


MCQ Question 119

Which of the following is the output of the following command?

```
echo "hello" | grep -P "[0-9]"
```

- A) No output
- B) hello
- C) [0-9]
- D) None of the above

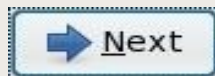




MCQ Question 120

Which of the following does the regex `\w` pattern match?

- A) Word
- B) Whitespace
- C) Width, which is the second parameter, like `\w2`
- D) One character of a Word, as in a non-numeric digit

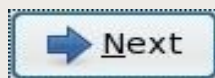
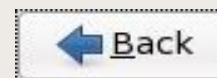




MCQ Question 121

What changes when you make `\d` into `\D`, `\w` into `\W`, etc?

- A) It reverses what matches it.
- B) It matches nothing
- C) It's an illegal character
- D) It makes no difference
- E) None of the above

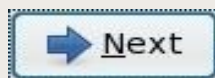
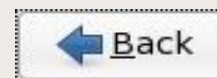




MCQ Question 122

What is the time complexity of putting N elements into a priority queue?

- A) $O(1)$
- B) $O(\log(N))$
- C) $O(N)$
- D) $O(N\log(N))$
- E) $O(N^2)$
- F) $O(N^3)$
- G) $O(2^N)$
- H) None of the above

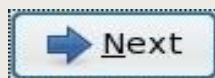
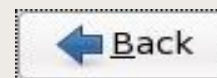




MCQ Question 123

Rank the time complexities in order from best to worst.

- A) $O(1)$ $O(N)$ $O(\log(N))$ $O(N^2)$ $O(2^N)$
- B) $O(N)$ $O(1)$ $O(2^N)$ $O(N^2)$ $O(\log(N))$
- C) $O(1)$ $O(\log(N))$ $O(N)$ $O(N^2)$ $O(2^N)$
- D) $O(2^N)$ $O(N^2)$ $O(N)$ $O(\log(N))$ $O(1)$
- E) $O(1)$ $O(N)$ $O(N^2)$ $O(\log(N))$ $O(2^N)$
- F) None of the above orderings are correct







MCQ Question 124

Which algorithm can give the level order traversal of an unweighted, undirected graph in the shape of a binary tree? Select the best option.

- A) Depth first search
- B) Breadth first search
- C) Dijkstra's algorithm
- D) Prim's algorithm
- E) Kruskal's algorithm
- F) None of the above are correct.

B

 [Back](#)

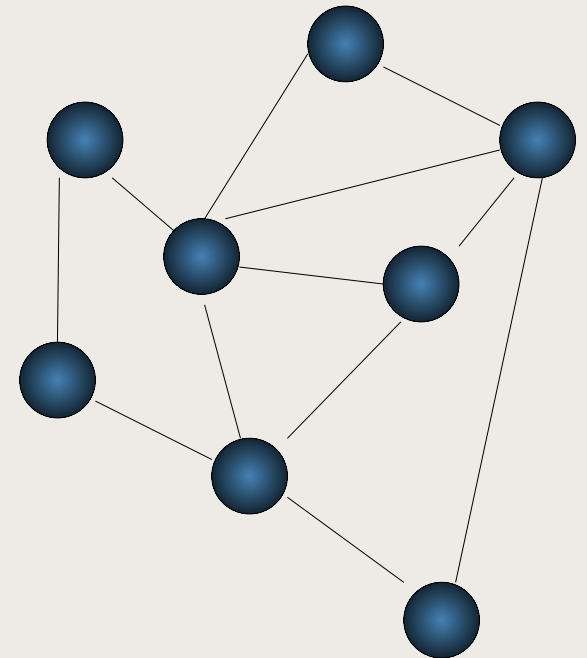
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MCQ Question 125

Is the following graph strongly, or weakly, connected?

- A) Weak
- B) Strong
- C) Neither



c

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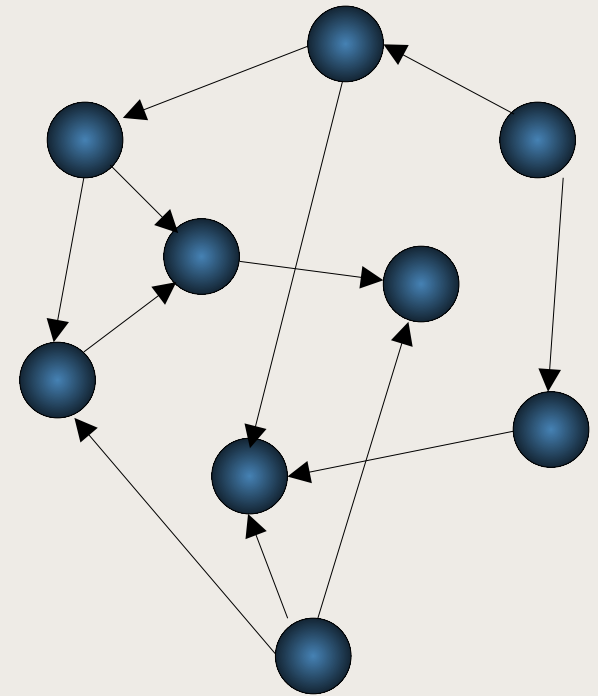
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MCQ Question 126

Is the following graph strongly, or weakly, connected?

- A) Weak
- B) Strong
- C) Neither



A

← Back

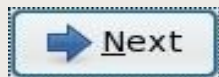
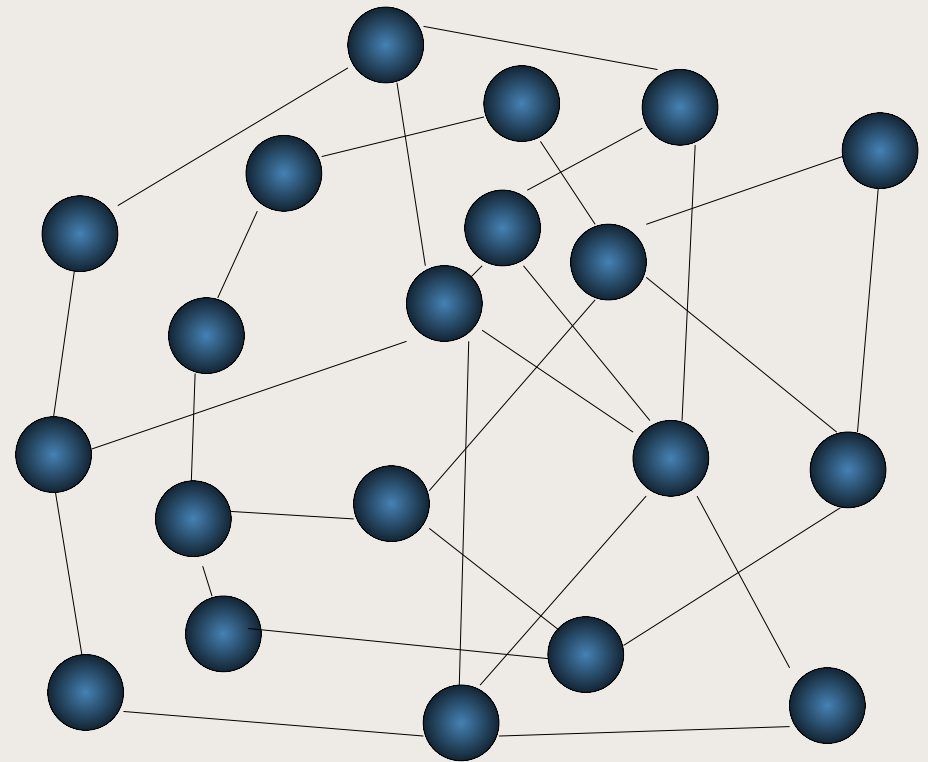
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MCQ Question 127

Is it possible to build a MST of the following graph?

- A) Yes
- B) No

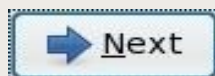




MCQ Question 128

What is the time complexity of a depth first search in a graph?

- A) $O(1)$
- B) $O(V)$
- C) $O(E)$
- D) $O(V^2)$
- E) $O(E^2)$
- F) $O(EV)$
- G) $O(V \log E)$
- H) $O(E \log V)$
- I) $O(V^E)$

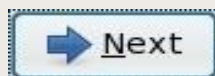




MCQ Question 129

What keyword in a DOT file is used to signify a directed graph?

- A) graph
- B) directed
- C) digraph
- D) directed_graph
- E) dgraph
- F) d_graph
- G) dg
- H) graph_directed
- I) graph_dir
- J) None of the above



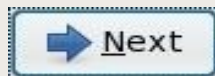


MCQ Question 130

What could the following command do? Select all that apply.

```
echo "Hello" >> file.txt
```

- A) Create a new file called file.txt
- B) Error out if file.txt does not exist
- C) Replace the existing (not empty) contents of file.txt with "Hello" sans the quotes
- D) Append "Hello" sans the quotes, to the end of file.txt
- E) None of the above are correct

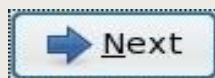
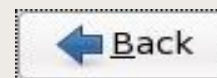




MCQ Question 131

Will the file in the previous question end with a new line?

- A) Yes
- B) No
- C) It will not be created





MCQ Question 132

When using the apache2 web server, and assuming the domain name is example.com, what would be the URL that is used by javascript code to fetch data from a script called script.cgi? Select all that apply.

- A) `example.com/script.cgi`
- B) `example.com/cgi-bin/script.cgi`
- C) `example.com/usr/lib/script.cgi`
- D) `example.com/var/www/script.cgi`
- E) `example.com/../../usr/lib/script.cgi`
- F) None of the above

